☐ UNCLASSIFIED ☐ INTERNAL ONLY ☐ CONFIDENTIAL ☐ SECRET

ROUTING AND RECORD SHEET

SUBJECT: (Optional)

FROM: [redacted]
Chief, Real Estate and
Construction Division, OL

EXTENSION: [redacted]

NO. STAT

DATE STAT

TO: (Officer designation, room number, and building)	DATE RECEIVED	DATE FORWARDED	OFFICER'S INITIALS	COMMENTS (Number each comment to show from whom to whom. Draw a line across column after each comment.)
1. Director of Logistics [redacted]	2 AUG 1979			The attached memo from D/ORD is presently being investigated by [redacted] and [redacted] in FEB. The original letter came to me prior to your seeing it and I wanted to let you know that work is in progress. We plan to discuss the matter fully with the Ames Building personnel and see if the matter can be corrected within the allowable limits of the energy regulations. I will keep you advised as work progresses. Tony Tony
2. ED/OL	2 AUG 1979			
3. ~~C/RECD~~				
4. ~~C/FEB~~				
5. D/L	8 A[illegible]			
6. C/RECD				
7.				
8.				FEB WILL ALSO DISCUSS THE ISSUES WITH THE OWNER'S BUILDING MANAGER, BUILDING ENGINEER, AND WITH MR CARRUTHERS OR HIS REPRESENTATIVE AS POSSIBLE.
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13.				MORI/CDF Pages 2 thru 8
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Preliminary Study
Small Boilers in the Headquarters Building and the Printing & Photography Building

I. Background

As worldwide interest in energy has changed because of the rising cost and questionable availability of oil, the economical approaches to the efficient use of energy have expanded. While the thrust of past efforts was to design and maintain power plants to meet demands efficiently, a new parameter includes expenditures for various sizes of equipments to meet limited special conditions. Such expeditures would not have been economically justified prior to the oil crisis.

To increase steam production efficiency in the Headquarters area, studies have been made and projects have been designed to take advantage of the available resources. An early study examined the feasibility of generating steam by burning the refuse from the classified waste disposal systems. Though initial information appeared promising, the final conclusion was that it took more energy to burn the refuse to make steam than it took to make steam without the refuse.

A study was made to determine if a smaller boiler could be placed in the Powerplant to provide steam more efficiently during late spring through early fall when steam requirements were less. The small boiler could also be fired in concert with one or more of the existing large boilers to efficiently satisfy peak requirements. The study indicated that such a project would be effective in conserving energy and a design for this work is now near completion.

II. Requirement

To this point, the steam conservation efforts have been targeted at the Powerplant. Since the Powerplant and the buildings served by the Powerplant are remoted from each other, steam transmission lines are required to provide service. While new steam lines are being designed to replace existing lines and provide redundant transmission facilities, any steam line will radiate some amount of heat regardless of the insulation. This amount is rather constant and is a function of the properties of the insulation.

During winter operation, the buildings use an amount of heat that is relatively large compared to the heat that is lost through the transmission lines, since the lines are designed to handle the greatest heating requirement. During summer when the heating needs are less, the heat lost through the transmission lines is theoretically only slightly less than in the winter. Since the steam used has dropped significantly while the transmission lose has almost remained constant, the transmission lose now becomes a significant part of the overall summer steam load.

The requirement then is to determine if there is an economically efficient way to operate the Headquarters complex during some summer period so that the Powerplant's steam equipment and transmission lines can be secured and some energy saved.

III. Discussion

A. Steam is supplied in quantity to two main facilities, the Headquarters Building and the Printing & Photography Building. As both have significantly different functions and equipment, they will be discussed separately.

1. Headquarters

The main uses of steam in the summer are for operating cafeteria equipment and for heating water for comfort facilities and for film type processors. A small amount is used for humidity control. The film processor and humidifier steam loads are individually small and scattered. They could probably be satisfied by individual electric hot water heaters and portable humidifiers. The hot water for comfort facilities can probably be secured during this period. An exception would be the medical facility on the first floor and then an electric hot water heater could be installed.

The cafeteria steam load is large and concentrated. The utility room under the cafeteria kitchen contains an old fan and an old chiller, either of which could be removed to provide space convenient to the existing steam distribution station for a boiler of sufficient size for the cafeteria. The exhaust stack could be run vertically in the south courtyard. The boiler could be fired using the same propane gas line now used for the classified waste incinerator. The boiler would be fired at a low 15 pounds per square inch pressure setting, eliminating the need for an additional operator.

The disadvantage is that there would be no quick backup should the small boiler fail since the Powerplant boilers and the transmission lines would be cool. The estimated time to start the main boilers, heat the transmission lines and supply steam would be between eight and ten hours assuming that the steam system is not in some maintenance or repair status.

B. Printing & Photography Building

Steam is used in the Printing & Photography Building to provide hot water for film processors, chemical mixing operations, comfort facilities and for temperature and humidity control. All of these needs are important to a printing and photography facility. All of these needs could be handled by a small boiler located in the basement of the Printing & Photography Building in available space convenient to the existing steam station. The exhaust stack could be routed vertically through the first floor and roof. The boiler could be oil fired with oil being supplied by a pipe line between the boiler and the existing fuel tanks at the Powerplant.

The disadvantage is again the loss of the boiler and the eight to ten hour minimum period before steam could be supplied from the Powerplant.

C. The heat lost through the existing transmission lines would be difficult to determine accurately without outside assistance as the piping is in questionable condition as evidenced by a GSA project, estimated at more than $1,000,000, to replace it and some chilled water lines. However, by comparing the June fuel oil consumption rate with the maximum firing rate of the two small boilers discussed above, an estimated saving of between 22,000 gallons and 37,000 gallons of fuel oil could be realized for the period of July and August.

D. The cost of installing the two boilers is estimated to be in the $110,000 to $125,000 range in the FY 79-80 period. The cost to install electric hot water heaters has been discussed with the GSA Langley Buildings

Steam Generating Efficiency

To reduce fuel costs to a minimum, the steam generating equipment should operate at or near maximum efficiency on a continuous basis. Toward that goal, the steam requirements have been divided into operational modes consistent with seasonal loads and have been phased assuming that additional equipment is placed for maximum efficiency.

1. Phase I

Phase I is the present operational mode whereby all steam is produced by one or more of the three large boilers in the Powerplant. The steam that is produced is supplied to the various campus buildings via steam transmission lines.

2. Phase II

Phase II assumes the installation of a small boiler (less the half of the capacity of one large boiler) in the Powerplant. This small boiler is sized to be efficient over a five month, late spring through early fall, period. It can also be used during those winter periods when the load requirement would fall within a range where the combination of one large boiler plus the small boiler would be more efficient that than the combination of two large boilers. The energy savings result first from matching the equipment capabilities to the load. Second, the new boiler incorporates more automatic controls as well as improved technology and design to eliminate the effects of presently performing some manual operations and to reduce the impact of operator error or judgment.

The operating efficiency of the boilers has recently ranged from a high of 81 percent in January to a low of 70 percent in May. For the purpose of computing a fuel saving it is assumed that the average summer efficiency without the new boiler is 74 percent, that the efficiency with the new boiler will be between 80 percent and 82 percent, and that the average steaming rate will be 13,000 pounds of steam per hour. The expected savings under these assumptions should be between 30,000 gallons and 45,000 gallons of No. 6 fuel oil for the summer period of May through September.

3. Phase III

Phase III assumes the installation of small boilers located in individual buildings instead of in the Power plant. These individual boilers are sized against the summer loads. During a Phase III operation, the Powerplant and the campus transmission lines would be secured. The energy savings would result from further matching of the additional equipment to a reduced load and from not producing the heat normally lost from the Powerplant equipment and the transmission lines. The energy saving beyond Phase II is estimated to be between 5,320 and 24,400 gallons of No. 6 fuel oil. The estimated saving if Phase II were not implemented was previously estimated to be between 22,300 and 37,200 gallons of No. 6 fuel oil.

The above three phases represent a plan of progressive refinement of steam conservation. Phase II is the result of a detailed study by an independent engineering company. It represents an addition to the primary steam generating equipment in the Powerplant to maximize the operating efficiency of that facility, and it is a funded project with design nearly complete. The third phase is the result of trying to determine if there is any way to go beyond Phase II and achieve additional savings. While Phase III has not been studied in the same detail as Phase II, the preliminary examination indicates that additional energy saving may be realized by reducing some steam service in the Headquarters and Printing & Photography Buildings and by installing small boilers and electric hot water heaters where service cannot be reduced. This third phase should continue to be examined, probably by GSA because of their more primary role in operating the Headquarters facilities.

A bar chart illustrating the three phases described above is attached.

Att

Field Office personnel, and it was agreed that GSA would attempt to fund the cost of the hot water heater installations in the Headquarters Building.

E. One building that has not been discussed is the Motor Pool. This facility normally uses hot water for comfort facilities and showers but as an energy saving measure the steam to this facility is presently secured for the summer.

IV. Conclusion and Recommendations

It appears that the installation of a small boiler in Printing & Photography Building and the installation of a small boiler and an assortment of electric hot water heaters and humidifiers in the Headquarters Building could be an energy saving project.

The General Services Administration is the operator of the Headquarters complex and is the primary agency to make such energy oriented changes or alterations to the physical plant as this study addresses. It is, therefore, recommended that the GSA be advised of this preliminary study so that it may be examined in more detail by their engineers and incorporated in their energy conservation programs as appropriate.

Phase One: Present

One or more large boilers in the power plant.

Phase Two: Add small boiler to the power plant.

Phase Three: Add Bld boilers and elec. hot water heaters.